

Claims 1 and 2 are pending in the present application. Both claims stand rejected under 35 U.S.C. § 112, second paragraph due to grammatical and idiomatic errors. Applicants submit that the claim amendments overcome these rejections.

Claims 1 and 2 both stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,912,912 to Tagomori in view of U.S. Patent No. 4,903,456 to Meur. Applicants respectfully traverse this rejection for the following reasons.

In the present invention, an inching mode is claimed which stops the rotation of the timing plate at every hole formed in the timing plate. These holes correspond to every individual process (or number) in the band packing system. When the rotation of the timing plate is stopped, the timing shaft of each of the presser members, or the location of the support block, are manually adjusted. The inching mode is utilized only when adjustment is required.

Tagomori discloses a band packing process which is controlled by the use of a timing plate 70. As shown in Figs. 1 and 2 of Tagomori, the slits 71-75 of the timing plate 70 are detected by the sensor 72 by rotating the timing plate 70. Pursuant to the rotation of the timing plate 70, which detects the slit locations, each process of the band packing system is performed separately, or one by one. In the band adhesion process, rotation of the timing plate 70 is stopped by the timer, and the band is stuck by pressure. This is a temporary stop for providing the time necessary to stick the band by pressure, which occurs in each cycle. One complete cycle of band packing is thus performed continuously without interrupting the cycle.

Figs. 1 and 2 of Meur disclose a timing plate 60 having a plurality of holes and a sensor or detection means 62. However, Muer contains no disclosure that the machine is stopped during every process and the timing and location of the members are adjusted.

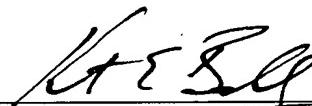
Thus, neither cited reference, alone or in combination, teaches a controller which is capable of stopping the rotation of the timing plate upon every detection of a hole thereon, which permits the position of each member to be checked and placed in its proper position.

In view of the foregoing, reconsideration of the outstanding rejections and the allowance of claims 1 and 2 is respectfully requested.

Respectfully submitted,

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MARKED-UP VERSION OF THE CLAIMS

1. (Amended) A controller in a banding packing machine, comprising:

a cam shaft [to be] which is rotated upon receipt of force from a driving source;

a plurality of cams provided [in] on the cam shaft;

a timing plate provided [in] on the cam shaft [and], the timing plate having a plurality of holes [hole] formed thereon which correspond [corresponding] to a predetermined position such that a plurality of rotation [position] positions of the cam shaft can be detected; [and]

a detecting means for detecting that each of the plurality of holes [the hole] formed on the timing plate [reaches] has reached the predetermined position[,]; and

[wherein] an inching mode [is provided in which] capable of stopping the rotation of the cam shaft [is stopped] when the detecting means detects [the predetermined hole of] each of the plurality of holes formed on the timing plate.

2. (Amended) The controller in a banding packing machine according to claim 1, wherein [an] the inching mode [for stopping the rotation of the cam shaft when the detecting means detects the predetermined hole of the timing plate, and] is switchable with an operation mode [for], said operation mode causing the detecting means to detect the [hole] plurality of holes formed on [of] the timing plate, thereby driving the cam shaft in a normal cycle [is switchable] without stopping the rotation of the cam shaft.



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MARKED-UP VERSION OF THE SUBSTITUTE SPECIFICATION

CONTROLLER IN A BANDING PACKING MACHINE

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

[0001] The present invention relates to a banding packing machine and more particularly to a controller in a banding packing machine which controls [to carry out] cutting, welding and the like for binding a band in a predetermined [timing] timed cycle.

2. DESCRIPTION OF THE PRIOR ART

[0002] In an automatic or semi-automatic banding packing machine, a band led from a band reel is wound upon an object to be packed and is then clamped, and subsequently, is returned to the band feeding side and is tightened. Then, a bound portion of the band is melted by a heater almost simultaneously with the cutting and is then bonded by means of a press. These operations are carried out continuously and instantaneously in one cycle.

[0003] In such a banding packing machine, a control portion utilizing a cam is provided to precisely carry out the operations. The control portion controls [a] the timing of the operations of the band packing machine. More specifically, a plurality of cams are provided [in] on one cam shaft of the control portion. When the cams are rotated with the cam shaft, cam followers corresponding to the cams are moved vertically so that a plurality of members carry out [a] their predetermined operations, such as [operation. Thus,] clamping, return, tightening and the like.

[0004] [In the case in which] When a large number of operations are to be thus carried out continuously in a short time period, [a] the band is [gripped] insufficiently

gripped and the band cannot be sufficiently returned [sufficiently] if member positions [are] become shifted during the operation of the cam and the cam follower, or during the operation of a roller and a touch roller.

[0005] When an operation failure occurs in any of these operations in a conventional banding packing machine, it is necessary to stop all driving operations at once. [and then] The [the] cam shaft must then be manually rotated to perform a banding operation. [That is,] Specifically, in order to determine whether or not related members are set in their proper positions, the cam shaft [should] must be rotated to each of [an] its original position, a reverse rotation start position, a tightening start position, a normal rotation start position and the like on the cam shaft[, in order to determine whether or not related members are set in a normal position].

[0006] However, [there has been a problem in that] it is [necessary to take a great deal of] time and labor intensive to [for a working of] manually [rotating] rotate the cam shaft [at each time] to each position and confirm [carrying out slight regulation to obtain] an accurate positional relationship. Furthermore, it is [hard] difficult to decide whether or not a stop position is reached after the manual rotation is in a normal position.

SUMMARY OF THE INVENTION

[0007] In [consideration of the circumstances] view of the foregoing, it is an object of the present invention to provide a controller in a banding packing machine which can [slightly] regulate an operation distance [through an operation to be utilized for slightly regulating an operation distance] by a link operation, and can easily [set a] correct a shift from the [condition when the controller in the banding packing machine for

clamping, returning and tightening a band has a timing shifted from a] predetermined, correct [timing] timed cycle.

[0008] In order to attain [the] this object, the present invention provides a controller in a banding packing machine, comprising:

[0009] a cam shaft [to be] which is rotated upon receipt of force from a driving source;

[0010] a plurality of cams provided [in] on the cam shaft;

[0011] a timing plate provided [in] on the cam shaft [and], said timing plate having a hole formed thereon [corresponding] which corresponds to a predetermined position [such] so that a rotation position of the cam shaft can be detected; and

[0012] a detecting means for detecting that the hole formed on the timing plate [reaches] has reached the predetermined position, and

[0013] [wherein] an inching mode [is provided in] which stops the rotation of the cam shaft [is stopped] when the detecting means detects the [predetermined] hole [of] formed on the timing plate.

[0014] With such a structure [according to the present invention], it is possible to ascertain whether or not a related member is [placed] in its proper [a] predetermined position by setting [an] the inching mode to occur when the hole formed on the timing plate reaches a predetermined position. In the case [in which it is confirmed that] when the related member does not have a predetermined positional relationship, it is preferable that [a] the power source [should] be [once] turned off a single time to regulate the position.

[0015] It is preferable that the following two modes be switchable: (1) the [an] inching mode for stopping the rotation of the cam shaft when the detecting means detects the [predetermined] hole of the timing plate[,]; and (2) the [an] operation mode for causing the detecting means to detect the hole of the timing plate, thereby driving the cam shaft in a normal cycle [should be switchable].

[0016] If the inching mode and the operation mode can be thus switched, the inching mode is set before a first operation is carried out and it is ascertained whether or not the inching mode is set in [a] the normal condition. If the inching mode is set in the normal condition, the operation mode may be exactly set to carry out a continuous operation. On the other hand, if [it is decided that] the positional relationship is not accurate, it is preferable that the position regulation [should] be [precisely carried out] performed again and the operation mode [should be] then be set.

[0017] As described above, [according to] when the inching mode is set, the controller in the banding packing machine in accordance with the present invention[,] makes it [is] possible to [decide] determine, at each time, whether or not the positional relationship of each member is set in a correct position [condition in a state in which the inching mode is set].

[0018] Accordingly, it is possible to easily adjust the positional relationship between the members.

[0019] These objects as well as other objects, features and advantages of the present invention will become more apparent to those skilled in the art from the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Fig. 1 is an exploded perspective view showing a control portion in a banding packing machine according to an embodiment of the present invention[,];

[0021] Fig. 2 is a front view showing a state in which the control portion according to the embodiment is assembled;

[0022] Fig. 3 is a perspective view showing a timing plate fixed to a cam shaft; and

[0023] Fig. 4 is a sectional view showing an operation for carrying out banding by means of the control portion according to the present embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0024] An embodiment of the present invention will be described below with references to the drawings.

[0025] Fig. 1 shows a control portion in a banding packing machine for [carrying out] performing an operation for clamping, welding and cutting a tip portion of a band.

[0026] In the control portion, a right presser member 2, a left presser member 4 and a middle presser member 6, which are vertically moved by the operation of a cam mechanism, are accommodated in a support block 8, and the support block 8 is supported between a pair of fixed plats 12 and 14 through a screw member 10 or the like.

[0027] [On the other hand, as] As shown in Fig. 2, a cam shaft 22 is rotatably supported on shaft insertion holes 11 and 13 formed on the fixed plates 12 and 14. The cam shaft 22 is rotated upon receipt of the force of a driving source such as a motor which is not shown. Cam followers 16, 18 and 20 are attached to the lower parts of the right presser member 2, the left presser member 4 and the middle presser member 6,

respectively. In addition, these cam followers 16, 18 and 20 abut on the peripheral surfaces of cams 24, 26 and 28 provided [in] on the cam shaft 22. The cam followers 16, 18 and 20 are pulled toward the cam side with spring 30 so that they are maintained in [the abutment state] a position which abuts on the cams. A timing plate 45 is fixed integrally with the cam shaft 22.

[0028] The position [state] of the cams 24, 26 and 28, and members to be operated [based on] by the cams [in a series of motions thereof], can be confirmed by the timing plate 45, when the cams 24, 26 and 28 supported on the cam shaft 22 are rotated. For example, three holes 42, 44 and 46 are formed apart from each other at [a] predetermined [interval] intervals as shown in Fig. 3. For example, the detection of the holes 42, 44 and 46 indicates [implies that of] the start of each step. If the [ration] rotation of the cam shaft 22 is [caused to stand by] stopped when the hole 42 is detected, it is possible to identify the positional relationship between the members for the start of a next step.

[0029] Accordingly, if the cam shaft 22 is placed in an original position when the hole 42 is detected, for example, it is possible to ascertain whether or not the right presser member 2, the left presser member 4 and the middle presser member 6 are set in [correct conditions] their proper [at the] original position.

[0030] Accordingly, if the position is correct at that time, a signal for the original position can be output with the [in a] correct timing cycle.

[0031] As shown in Fig. 4, the band B is inserted into a guide hole 48 of the right presser member 2 by the driving force of a band feeding roller 50. When the tip of the band B is passed through the band arch 51 and abuts on a stopper (not shown) by the

driving force of the band feeding roller 50, the right presser member 2 is lifted to interpose the band B between the non-slip portion 49 and the slide table 34.

[0032] Thereafter, the band feeding means 50 is reversed in the directions of the arrows in Fig. 4 to pull the band B. Consequently, the band B is forcibly removed from a band guide arch 51 and is wound onto an object W to be packed. When the band B is wound onto the object W to be packed, band B is further pulled and tightened. After the band B is thus tightened, the left presser member 4 is moved to an uppermost position to interpose the binding rear end side of the band B between the non-slip portion 3 of the left presser member [3] 4 and the slide table 34. In this state, the binding tip portion of the band B and the binding rear end portion are opposed to each other with a space maintained vertically. A heater 36 is inserted in the space, thereby melting the surface of the band B. When the surface of the band B is molten, the middle presser member 6 is lifted to push the molten portion thereagainst and is bonded thereto. At this time, the cutting blade 40 of the middle presser member 6 cuts the band B together with the right presser member 2.

[0033] Thus, a series of banding works are carried out. If the [a] heater 36 shown in Fig. 4 is supposed to protrude from the side when the hole 44 is detected, it is necessary to [carry out] adjust its location [regulation again] if the heater 36 is not in a protruded position when the hole 44 is detected. In the present embodiment, an inching mode is set so that the rotation of the cam shaft 22 is stopped when detecting means 50 detects the hole 44. Therefore, it is possible to easily ascertain whether or not the heater 36 has protruded correctly.

[0034] In [the] prior art banding packing [machine] machines, usually, when [a] the power source is turned on, a normal cycle of operation [is carried out to clamp, return and tighten a band and to] occurs, which involves the clamping, return and tightening of a band, and then the pressure weld of the band through the heater, in that order. Therefore, even if the heater 36 has not protruded in [the] its original position, the cam shaft 22 passes by the same position and is rotated differently from the present invention [embodiment]. In the present [embodiment] invention, the cam shaft 22 stops rotating [once,] every time the holes 42, 44 and 46 are detected. Therefore, it is possible to ascertain whether or not each member is placed in a correct position.

[0035] In the control portion according to the present invention [embodiment, thus,] the inching mode for adjusting the positional relationship between the members is provided. Therefore, it is possible to ascertain whether or not the positional relationship has deviated during the stop.

[0036] In the [correct] proper condition, moreover, it is preferable that the operation mode should be exactly set to carry out a continuous operation.

[0037] Furthermore, if the inching mode and the operation mode can be thus switched, the operation mode can be set [immediately] to immediately operate the banding packing machine when it is in a correct position. Therefore, [a] deterioration in productivity can be prevented.

[0038] While the preferred embodiment of the present invention has been described above, the present invention is not restricted to the embodiment.

[0039] For example, while [the number of the] three holes [to be] are formed on the timing plate [is three] in the preferred embodiment, any number of holes may be

provided. Furthermore, the number of the cams [to be] provided in the cam shaft 22 is not restricted to three. [Furthermore] Additionally, [the] switching from the operation mode to the inching mode may be carried out by turning on a power switch while pressing a reset switch. Moreover, the reset switch is not restricted; [but] another switch may be used. In the inching mode, furthermore, the operation may be stopped in each timing and the reset switch may be pressed to proceed to a next step.

[0040] Numerous modifications and alternative embodiments of the present invention will be apparent to those skilled in the art in view of the foregoing description. Accordingly, this description is to be construed as illustrative only, and is provided for the purpose of teaching those skilled in the art the best mode of carrying out the invention. The details of the structure and/or function may be varied substantially without departing from the spirit of the invention and all modifications which come within the scope of the appended claims are reserved.